

A black and white photograph of a laboratory setting. In the foreground, a large piece of equipment, likely a hot plate or oven, has a prominent sign that reads "CAUTION HOT". On top of this equipment are several rectangular, perforated metal trays. To the right, in the background, there is a large metal bucket, a balance scale, and other laboratory instruments on a table. The overall scene suggests a technical or scientific environment.

2017 VAA Laboratory Round Robin

Michael C. Dudley
Director of Technical Services
Virginia Asphalt Association



Why Run a Round Robin?

- AC Content and Gradation results are used for:
 - Monitoring mixes
 - Adjusting mixes
 - Paying for mixes
- Volumetrics is a Go/No-Go decision
- Shutdowns and limited production cost money
- It's critical all tests are performed correctly.



Why ... Continued

- Let's look at cost:
 - Assume the average contract price for a ton of asphalt is \$70.00/ton
 - Per Specification, two acceptance and one monitor test per 1000 tons must be completed
- At the minimum rate of testing, the results will represent \$70,000 in asphalt



Why ... Continued

- If the results show acceptable material and the actual material fails, then owner is harmed
- If the results show acceptable material and the owner results show failing material resulting in limited production or shutdown, then the contractor is harmed if the material is actually acceptable



Need To Know Tests Are Performed Correctly

- There are two variables, other than the mix, that impact test results
 - Equipment
 - Make sure its calibrated and maintained properly
 - Technicians
 - Properly trained and following correct procedures



Imagine Splitting a Sample With Another Lab, But The Test Results Don't Match Why?

- Who is right?
- Which data do you use to make adjustments?
- What if it results in limited production, shutdown or pay reduction?



What Were We Hoping To Achieve?

1. With a known material, how reproducible are individual labs compared to a reference lab?
2. If variability is identified, what is the source of variability – equipment, person, procedures, or material?
3. How do individual test results compare to VDOT limits?



Past Round Robin

- Field mix was used
 - Bulk sampling
- There was a lot of variability in the results



Difference in This Round Robin

- Mix is a virgin SM-9.5A
- Lab produced samples
- Aggregate was sieved down on individual sieves
 - Separated on 14 sieves



Aggregates



Samples Were Mixed Individually

- Rice and Furnace samples were mixed in a small 5 quart mixer
- Gyratory was mixed in a bucket mixer
- Each sample was mixed for 1 minute



Packaged Individually

- All samples were packaged in wax lined boxes to reduce sticking and loss of AC due to absorption
- By preparing samples individually there was no need to split or separate any materials

Gyratory



Rice & Furnace

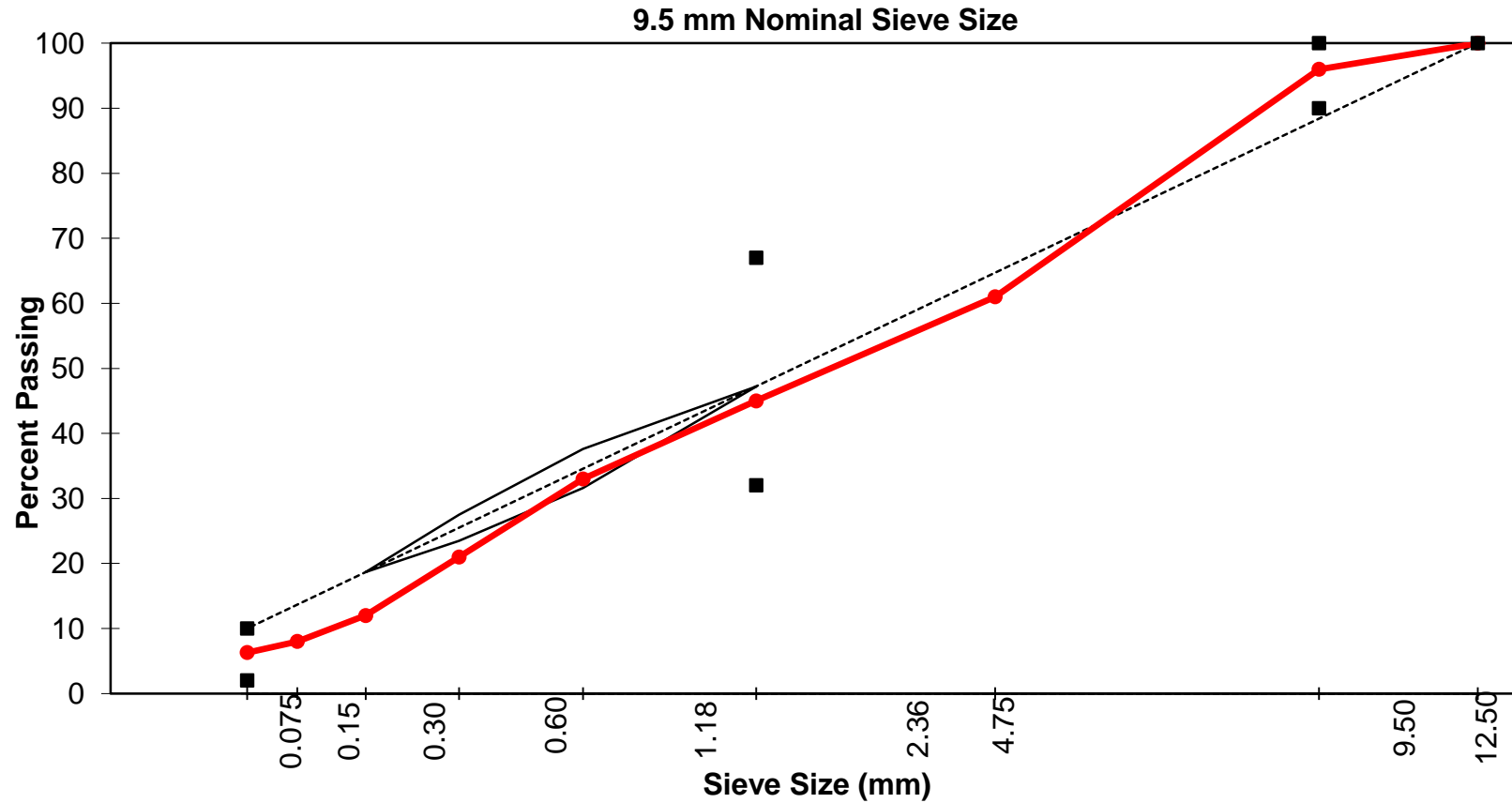


Production Control

- During production HTAS tested random samples to establish target values
- These values are the average of 5 samples:
 - G_{mm} 2.433
 - G_{mb} 2.341
 - AC 6.30 (oven corrected AC content)



Gradation



Instructions for Round Robin

- Minimal instruction was given to participants
 - Mix Type - SM-9.5A
 - Condition Rice Sample for 2 hours at 275F prior to testing
 - Burn Furnace Sample with 0.0 correction factor
 - Compact Gyratory Sample to 50 gyrations
- Most asked question: “What is the compaction temperature?”



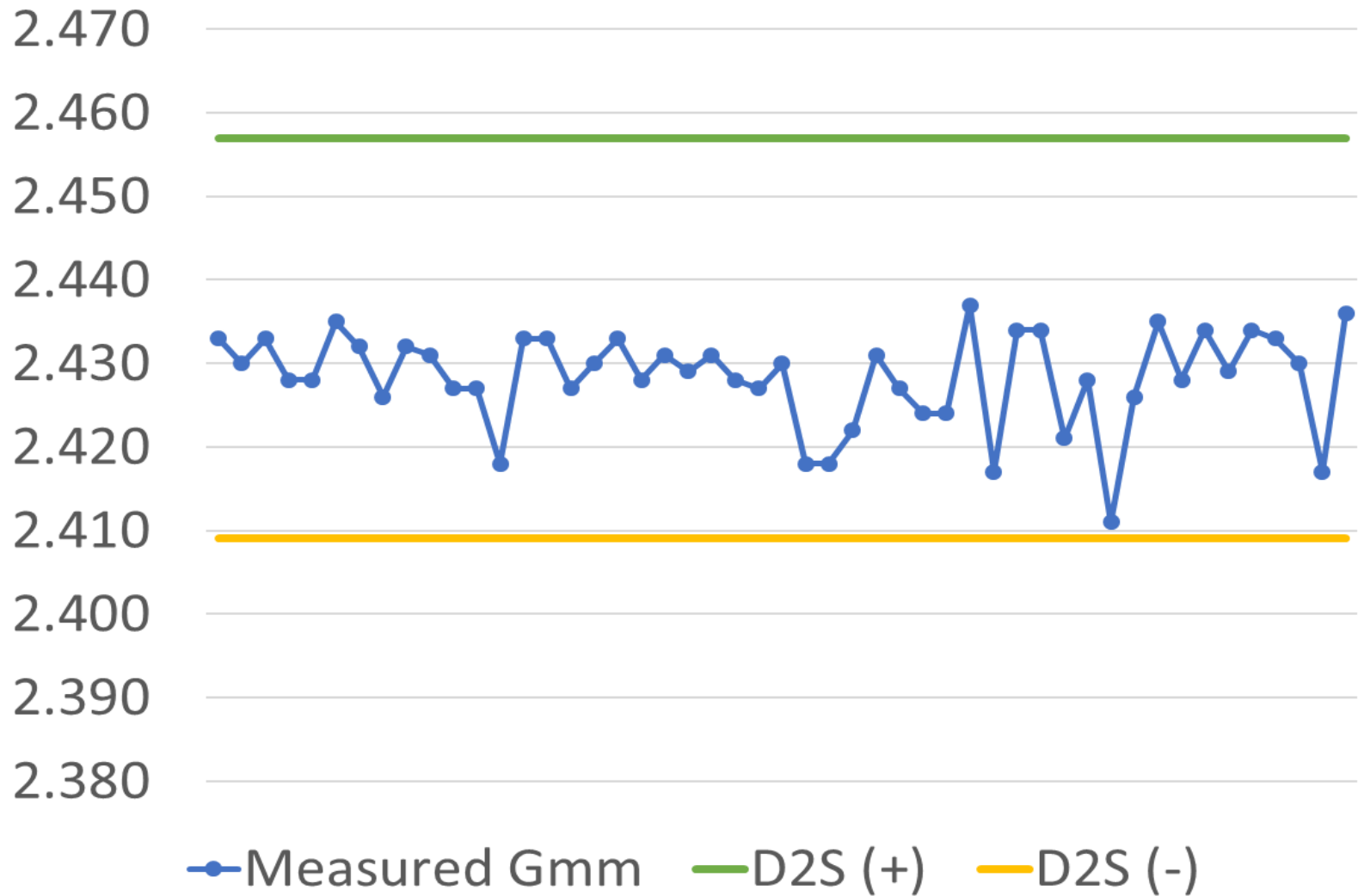
Participating Companies

- A & A Contractors
- Allan Myers
- B & S Contracting
- Boxley
- Branscome Companies
- Branscome Paving Company
- Chemung Contracting
- Colony Construction
- Francis O. Day
- Hi-Tech Asphalt Solutions
- Lee Hy Paving Corp
- National Asphalt Mfg
- Superior Paving Corp
- Virginia Paving Company
- S. L. Williamson Co Inc
- VTTI
- W-L Construction & Paving

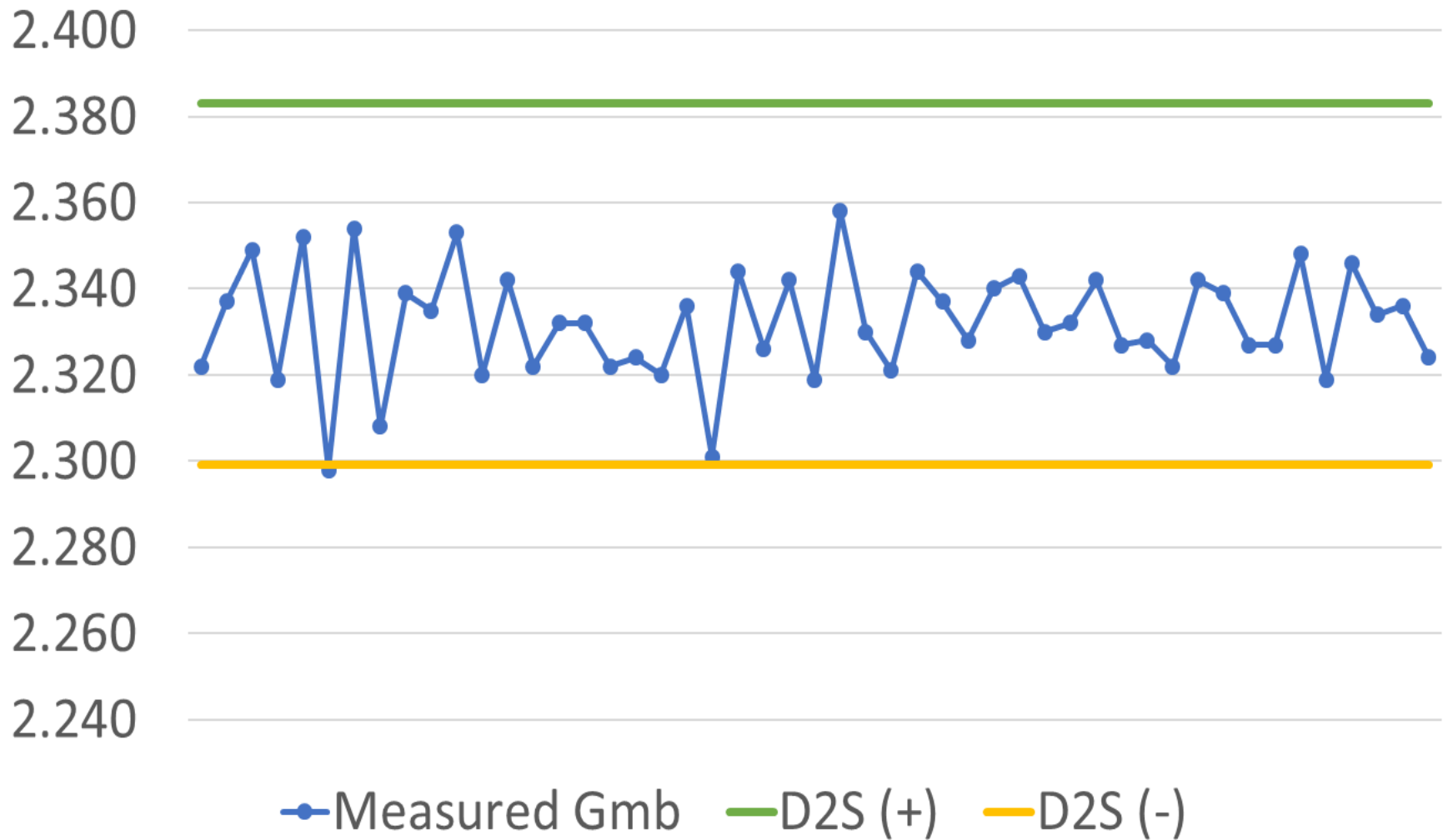
9 Labs AMRL Accredited



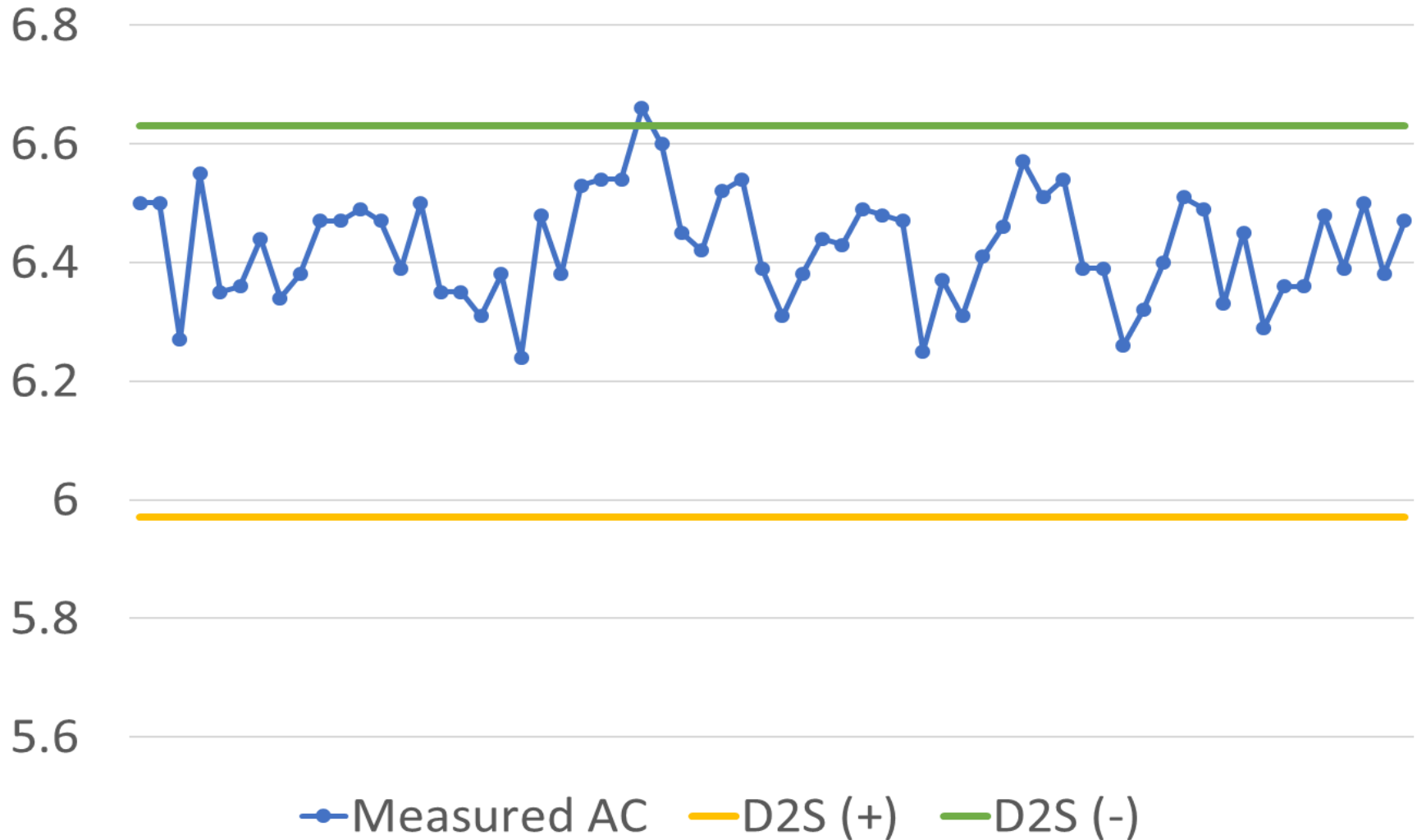
Measured G_{mm} vs. Reference G_{mm}



Measured G_{mb} vs. Reference G_{mb}



Measured AC vs. Actual AC by Sample



AMRL Observation

- AMRL Accreditation focuses on the lab not the technician
- Only one technician is required to perform each test
 - Not always the same technician that does the day to day testing?



Lessons Learned

- With a known material, participating labs/technicians reproduced reference lab results
- Overall standard deviation on G_{mm} , G_{mb} and gradations very low
- “Failed” results were identified and causes determined



Round Robin – Phase 2?

- Expand round 1 participating labs and technicians
- Investigate variability due to sampling procedures for specific gravities and volumetrics
 - Split sampling
 - Bulk sampling
- Develop Industry Credentialing Program for Plant Technicians



Special Thanks To

- Hi-Tech Asphalt Solutions, Inc.
- Vulcan Materials Company
- King William Sand & Gravel
- Asphalt Emulsion Industries, LLC



Questions

